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APPLICANT : FUJITSU VLSI LTD;

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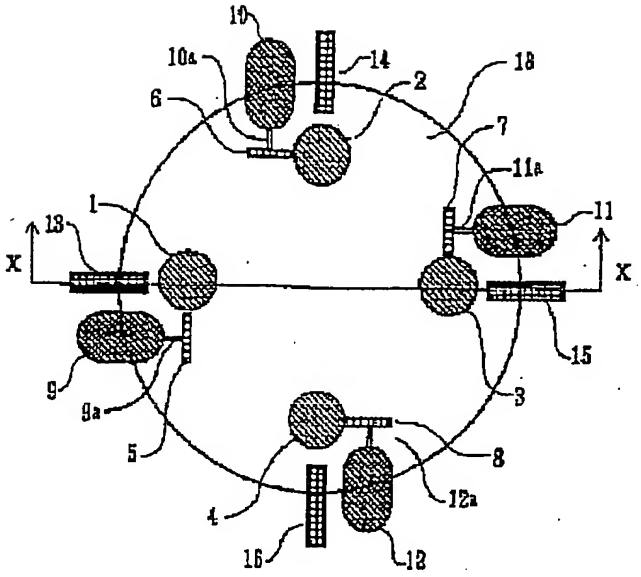
INT.CL. : H01L 21/68

TITLE : POSITIONING DEVICE



ABSTRACT : PURPOSE: To provide a positioning device on which a positioning mechanism having necessary accuracy can be provided in a small space without returning a wafer stage to the original point in a wafer positioning device.

CONSTITUTION: The positioning device is provided with spheres 1 to 4, which support a wafer 18 and provided at equal distance from the orthogonally intersecting biaxial intersection, pulleys 5 to 8 which are rotatory driven by motors 9 to 12, and sensors 13 to 16 which are covered by the circumference of the wafer and provided on two axes. Also, a control device, which controls the rotation of the motors 9 to 12 by the position of the wafer 18 detected by the covered part of the sensors 13 to 16 covered by the wafer, is provided.

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CLAIMS

[Claim(s)]
[Claim 1] solid sphere (1, 2, 3, 4) which supported the wafer (18) and prepared it respectively on these 2 shafts at the equal distance from the intersection of two shafts which intersect perpendicularly This solid sphere (1, 2, 3, 4) The pulley by which contacts, respectively and a rotation drive is carried out by the motor (9, 10, 11, 12) (5, 6, 7, 8), sensor (13, 14, 15, 16) respectively formed on these 2 shafts at the equal distance from the intersection of two shafts which are covered with the perimeter of said wafer (18) and intersect perpendicularly Said sensor covered with said wafer (18) (13, 14, 15, 16) The control unit which controls rotation of said motor (9, 10, 11, 12) by the location of said wafer (18) detected by the covering part (17), The pointing device characterized by providing.
[Claim 2] It is a sensor (13a, 13b) to the both sides of said sensor (13) which detect the location of the orientation flat of said wafer (18) in a pointing device according to claim 1. Pointing device characterized by providing.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the pointing device of a wafer. In the production process of a semiconductor device, before throwing a wafer into the manufacturing installation of a semiconductor device, to position to a position is required.
[0002] As positioning, there are positioning of the X-axis and the Y-axis which make the core of the stage of equipment and the core of a wafer in agreement, and theta shaft positioning which positions the orientation flat (it is called O.F. for short below) of a wafer in the predetermined direction.
[0003] The core of a wafer and the core of the stage of equipment are made in agreement from the above situations, and the pointing device which can position the direction of O.F. in the predetermined direction is demanded.
[0004]
[Description of the Prior Art] Drawing 7 explains the conventional pointing device to a detail. Drawing 7 is drawing showing the outline structure of the conventional pointing device.
[0005] The conventional pointing device consists of X-Y stage 21 which positions the core of the stage of the equipment which processes a wafer 18 as shown in drawing 7 , and the core of a wafer 18, a rolling mechanism 22 which positions the direction of O.F. of a wafer 18 in the predetermined direction, and a wafer stage 23.
[0006] When deciding the location of a wafer 18 with such a positioning device, X-Y stage 21 is moved and zero return is made to perform so that the wafer stage 23 in the location where X-Y stage 21 moved to the X-axis and Y shaft orientations, and shifted from the core of X-Y stage 21 first may be come to the core of X-Y stage 21.
[0007] Zero return of X-Y stage 21 is carried out for securing the movement magnitude of X-Y stage 21 as [position / at the core of X-Y stage 21 / the core of a wafer 18], when the location of the wafer 18 carried in the wafer stage 23 has shifted extremely.
[0008] After carrying a wafer 18 on the wafer stage 23 returned to the zero next, the core of a wafer 18 moves X-Y stage 21 so that it may come to the core of the stage of the equipment which will process a wafer 18 from now on.
[0009] Thus, after making in agreement the core of a wafer 18, and the core of the stage of the equipment which will process a wafer 18 from now on, a rolling mechanism 22 is rotated so that the direction of O.F. of a wafer 18 may come in the predetermined direction.
[0010] Since detection of the zero return of X-Y stage 21 is performed in the core of a pointing device, a sensor must be formed in the core of a pointing device and the sensor which detects the location of a wafer 18 must be formed in the periphery of a wafer 18.
[0011]
[Problem(s) to be Solved by the Invention] In the conventional pointing device explained above, since the sensor which the X-Y stage of a pointing device must be returned to a zero, and detects zero return, and the sensor which detects the location of a wafer had to be separately formed when a wafer was carried newly, there was a trouble that it was difficult to prepare the positioning device of a desired precision in a small tooth space.
[0012] This invention aims at offer of the pointing device which becomes possible [preparing the positioning device of a required precision in a small tooth space] without returning a wafer stage to a zero from the above situations.
[0013]
[Means for Solving the Problem] The solid sphere which the pointing device of this invention supported the wafer and was respectively prepared on these 2 shafts at the equal distance from the intersection of two shafts which intersect perpendicularly, The pulley by which contacts this solid sphere, respectively and a rotation drive is carried out by the motor, At the equal distance from the intersection of two shafts which are covered with the perimeter of this wafer and

intersect perpendicularly It constitutes so that the control section which controls rotation of this motor by the location of this wafer detected by the covering part of this sensor covered with this wafer in the positioning device which consists of a sensor respectively formed on these 2 shafts may be provided.

[0014]

[Function] Namely, a wafer is supported by the solid sphere respectively prepared on these 2 shafts in this invention at the equal distance from the intersection of two shafts which intersect perpendicularly. By a sensor's detecting the location of a wafer, rotating a motor using a control unit, and rotating a solid sphere by the pulley currently fixed to the motor shaft It becomes possible by making the X-axis and Y shaft orientation carry out straight-line migration of the wafer, or carrying out inverse rotation of this solid sphere to rotate that core for a wafer as a shaft, and to make O.F. in agreement in the predetermined direction.

[0015]

[Example] Drawing 1 - drawing 6 explain one example of this invention to a detail below. Drawing in which the top view of the pointing device of one example according [drawing 1] to this invention and drawing 2 show the X-X cross-section view Fig. of drawing 1 , and drawing 3 shows the relative-position relation between the wafer before positioning and a sensor, drawing in which drawing 4 shows the relative-position relation between the wafer after positioning and a sensor, the perspective view in which drawing 5 shows the condition of a wafer in position, and drawing 6 are the schematics showing connection of the control network of a pointing device.

[0016] four solid spheres which formed the wafer 18 respectively on these 2 shafts at the equal distance from the intersection of two shafts which intersect perpendicularly -- 1, 2, 3, and 4 It appears upwards. in practice, the wafer 18 -- a solid sphere -- 1, 2, 3, and 4 Although the dotted line should illustrate since it is not visible, it is displayed as the continuous line that it illustrates in drawing 1 .

[0017] These solid sphere 1, and 2, 3 and 4 They are pulleys 5, 6, 7, and 8, respectively. It is in contact with the perimeter and they are pulleys 5, 6, 7, and 8. It rotates. The revolving shafts 9a, 10a, 11a, and 12a of motors 9, 10, 11, and 12 are pulleys 5, 6, 7, and 8, respectively. It is inserted and fixed to the hole.

[0018] Sensors 13, 14, 15, and 16 which can detect the perimeter of a wafer 18 It is respectively prepared on these 2 shafts at the equal distance from the intersection of two shafts which intersect perpendicularly. these sensors -- 50dpi since it constitutes from the above photosensor array -- the resolution -- about 0.5mm it is -- input selector 17e of a control unit which explains later the number of the photo detectors covered with the wafer 18 It can count now.

[0019] drawing 2 -- the X-X cross-section view Fig. of drawing 1 -- it is -- a solid sphere -- if 2 and solid sphere 4 are rotated in the direction of an arrow head, it is possible to move a wafer 18 in the direction of an arrow head. in this case, although solid sphere 1 and solid sphere 3 are rotated with a wafer 18 by the direction of an arrow head, it is shown in drawing 1 -- as -- a solid sphere -- he is trying to slip in the contact section with the pulley 5 and pulley 7 in contact with 1 and solid sphere 3

[0020] If hard flow is made to rotate solid sphere 2 and solid sphere 4, it is possible to rotate a wafer 18 centering on the core of a wafer 18. this case -- a solid sphere -- although 1 and solid sphere 3 are rotated by hard flow with a wafer 18 -- a solid sphere -- he is trying to slip in the contact section with the pulley 5 and pulley 7 in contact with 1 and solid sphere 3

[0021] The relation between a wafer 18 and a sensor is explained below. The number of the photo detectors covered with the wafer 18 of a sensor 13 and a sensor 15 as the relation between the wafer 18 when the core of a wafer 18 has shifted from the core of a pointing device, a sensor 13, and a sensor 15 is shown in drawing 3 differs.

[0022] In such a case, if a wafer 18 is moved rightward in drawing as mentioned above, as shown in drawing 4 , it will become possible to make equal the number of the photo detectors covered with the wafer 18 of a sensor 13 and a sensor 15, and positioning of this direction will be completed.

[0023] Subsequently, if the number of the photo detectors similarly covered with the wafer 18 of a sensor 14 and a sensor 16 in the relation between a sensor 14 and a sensor 16, and a wafer 18 is made equal, positioning of this direction will also be completed and it will become possible to make in agreement the core of a wafer 18 and the core of a pointing device.

[0024] thus, the perspective view in the condition of having made the core in agreement -- drawing 5 (a) it is . In positioning O.F. of a wafer 18 in the location of a sensor 13 The number of the photo detectors covered with the wafer 18 of a sensor 14, a sensor 15, and a sensor 16 as shown in drawing 5 (b) is equal. The number of the photo detectors covered with the wafer 18 of a sensor 13 is O.F.18a from the number of the photo detectors with which other sensors are covered with the wafer 18. If it is made only for the number equivalent to the height of radii to decrease It is O.F.18a to the location of a sensor 13. It becomes possible to position.

[0025] This O.F.18a When the precision of positioning wants to improve Drawing 5 (c) It is O.F.18a of the both sides

of a sensor 13 so that it may be shown. It is sensor 13a within the limits of die length. Sensor 13b It prepares. A sensor 13 and sensor 13a It reaches. Sensor 13b If it is made for the number of the photo detectors covered with a wafer 18 to become equal, it is possible to perform highly precise positioning of a wafer 18.

[0026] It is input selector 17e about the number of the photo detectors covered with the wafer 18 of a sensor as shown in drawing 6 when rotating a solid sphere by the motor and the pulley. It is possible to input, to operate the pulse motor drivers 17a, 17b, 17c, and 17d (for it to be hereafter called a P.M. driver for short) using a control device 17, to rotate motors 9, 10, 11, and 12, and to position a wafer 18.

[0027] Thus, it becomes possible without preparing a positioning device in the core of a wafer, since a sensor can detect the relative position of a sensor and a wafer, a motor can be rotated with a control unit, a solid sphere can be rotated by the pulley and a wafer can be positioned to form a pointing device in a small tooth space.

[0028]

[Effect of the Invention] According to this invention, there is an advantage which becomes possible [preparing the positioning device of a required precision in a small tooth space] with the pointing device of very easy structure, and offer of the remarkable pointing device which can expect the effectiveness of economical and the improvement in dependability is possible so that clearly from the above explanation.

[Translation done.]

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TECHNICAL FIELD

[Industrial Application] This invention relates to the pointing device of a wafer. In the production process of a semiconductor device, before throwing a wafer into the manufacturing installation of a semiconductor device, to position to a position is required.
[0002] As positioning, there are positioning of the X-axis and the Y-axis which make the core of the stage of equipment and the core of a wafer in agreement, and theta shaft positioning which positions the orientation flat (it is called O.F. for short below) of a wafer in the predetermined direction.
[0003] The core of a wafer and the core of the stage of equipment are made in agreement from the above situations, and the pointing device which can position the direction of O.F. in the predetermined direction is demanded.

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PRIOR ART

[Description of the Prior Art] Drawing 7 explains the conventional pointing device to a detail. Drawing 7 is drawing showing the outline structure of the conventional pointing device.
[0005] The conventional pointing device consists of X-Y stage 21 which positions the core of the stage of the equipment which processes a wafer 18 as shown in drawing 7 , and the core of a wafer 18, a rolling mechanism 22 which positions the direction of O.F. of a wafer 18 in the predetermined direction, and a wafer stage 23.
[0006] When deciding the location of a wafer 18 with such a positioning device, X-Y stage 21 is moved and zero return is made to perform so that the wafer stage 23 in the location where X-Y stage 21 moved to the X-axis and Y shaft orientations, and shifted from the core of X-Y stage 21 first may be come to the core of X-Y stage 21.
[0007] Zero return of X-Y stage 21 is carried out for securing the movement magnitude of X-Y stage 21 as [position / at the core of X-Y stage 21 / the core of a wafer 18], when the location of the wafer 18 carried in the wafer stage 23 has shifted extremely.
[0008] After carrying a wafer 18 on the wafer stage 23 returned to the zero next, the core of a wafer 18 moves X-Y stage 21 so that it may come to the core of the stage of the equipment which will process a wafer 18 from now on.
[0009] Thus, after making in agreement the core of a wafer 18, and the core of the stage of the equipment which will process a wafer 18 from now on, a rolling mechanism 22 is rotated so that the direction of O.F. of a wafer 18 may come in the predetermined direction.
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EFFECT OF THE INVENTION

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In the conventional pointing device explained above, since the sensor which the X-Y stage of a pointing device must be returned to a zero, and detects zero return, and the sensor which detects the location of a wafer had to be separately formed when a wafer was carried newly, there was a trouble that it was difficult to prepare the positioning device of a desired precision in a small tooth space.
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MEANS

[Means for Solving the Problem] The solid sphere which the pointing device of this invention supported the wafer and was respectively prepared on these 2 shafts at the equal distance from the intersection of two shafts which intersect perpendicularly, The pulley by which contacts this solid sphere, respectively and a rotation drive is carried out by the motor, At the equal distance from the intersection of two shafts which are covered with the perimeter of this wafer and intersect perpendicularly It constitutes so that the control section which controls rotation of this motor by the location of this wafer detected by the covering part of this sensor covered with this wafer in the positioning device which consists of a sensor respectively formed on these 2 shafts may be provided.

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OPERATION

[Function] Namely, a wafer is supported by the solid sphere respectively prepared on these 2 shafts in this invention at the equal distance from the intersection of two shafts which intersect perpendicularly. By a sensor's detecting the location of a wafer, rotating a motor using a control unit, and rotating a solid sphere by the pulley currently fixed to the motor shaft It becomes possible by making the X-axis and Y shaft orientation carry out straight-line migration of the wafer, or carrying out inverse rotation of this solid sphere to rotate that core for a wafer as a shaft, and to make O.F. in agreement in the predetermined direction.
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EXAMPLE

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[0023] Subsequently, if the number of the photo detectors similarly covered with the wafer 18 of a sensor 14 and a sensor 16 in the relation between a sensor 14 and a sensor 16, and a wafer 18 is made equal, positioning of this direction will also be completed and it will become possible to make in agreement the core of a wafer 18 and the core of a pointing device.
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[0025] This O.F.18a When the precision of positioning wants to improve Drawing 5 (c) It is O.F.18a of the both sides of a sensor 13 so that it may be shown. It is sensor 13a within the limits of die length. Sensor 13b It prepares. A sensor 13 and sensor 13a It reaches. Sensor 13b If it is made for the number of the photo detectors covered with a wafer 18 to become equal, it is possible to perform highly precise positioning of a wafer 18.

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[0027] Thus, it becomes possible without preparing a positioning device in the core of a wafer, since a sensor can detect the relative position of a sensor and a wafer, a motor can be rotated with a control unit, a solid sphere can be rotated by the pulley and a wafer can be positioned to form a pointing device in a small tooth space.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The top view of the pointing device of one example by this invention,
[Drawing 2] The X-X cross-section view Fig. of drawing 1 ,
[Drawing 3] Drawing showing the relative-position relation between the wafer before positioning, and a sensor,
[Drawing 4] Drawing showing the relative-position relation between the wafer after positioning, and a sensor,
[Drawing 5] The perspective view showing the condition of a wafer in position,
[Drawing 6] Schematics showing connection of the control network of a pointing device,
[Drawing 7] Drawing showing the outline structure of the conventional pointing device,
[Description of Notations]
1, 2, 3, and 4 A solid sphere, and 5, 6, 7 and 8 For a pulley, and 9, 10, 11 and 12, a motor, and 9a, 10a, 11a and 12a are a revolving shaft, and 13, 13a, 13b, 14, 15 and 16. A sensor and 17 are a control device and 17a, 17b, 17c, and 17d. A P.M. driver and 17e An input selector and 18 are a wafer,

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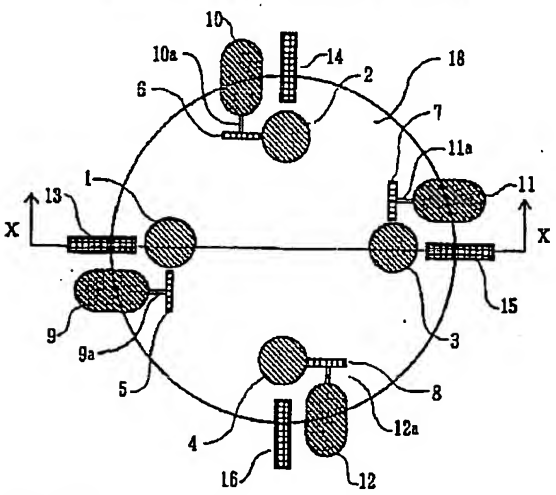
DRAWINGS

[Drawing 1]

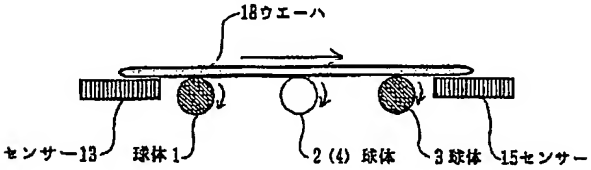
本発明による一実施例の位置決め装置の平面図



1, 2, 3, 4 は球体、 5, 6, 7, 8 はプーリー、 9, 10, 11, 12はモーター、
9a, 10a, 11a, 12aは回転軸、 13, 14, 15, 16 はセンサー、18：ウエーハ、

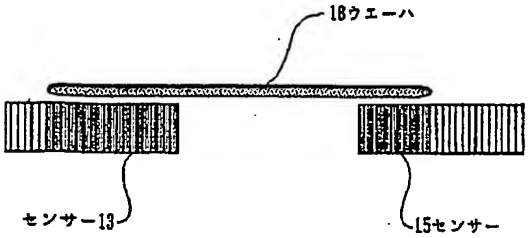
[Drawing 2]

図1のX－X断面矢視図



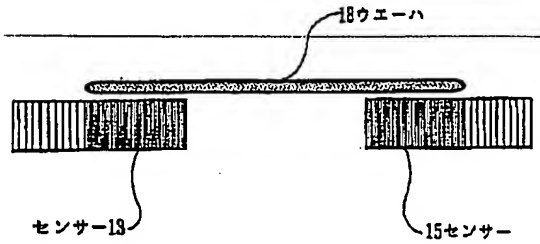
[Drawing 3]

位置決め前のウエーハとセンサーとの相対位置関係を示す図



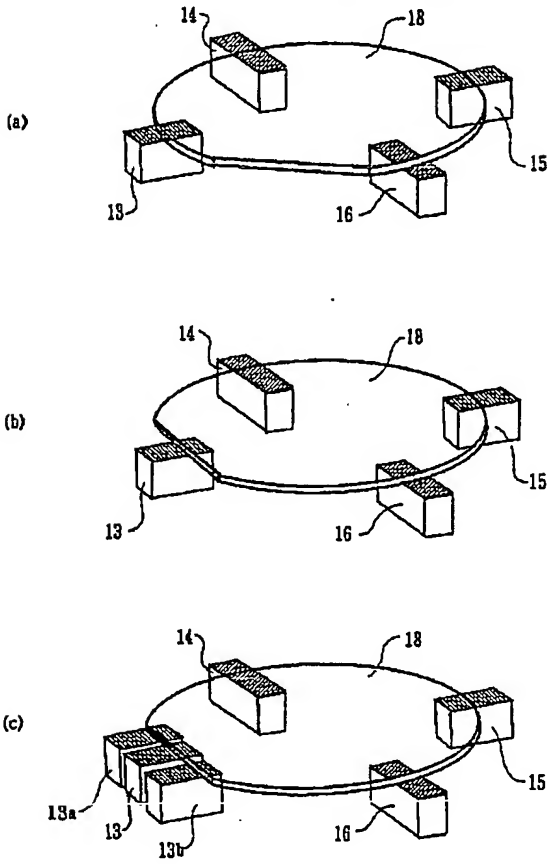
[Drawing 4]

位置決め後のウエーハとセンサーとの相対位置関係を示す図



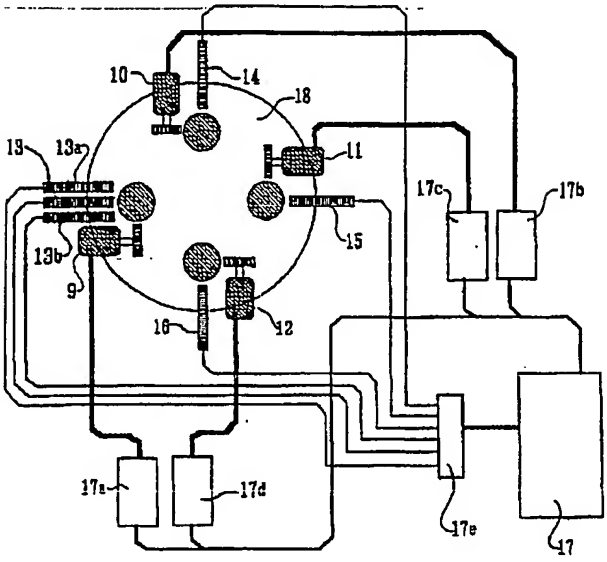
[Drawing 5]

ウエーハの位置決め完了状態を示す斜視図



[Drawing 6]

位置決め装置の制御系統の接続を示す結線図

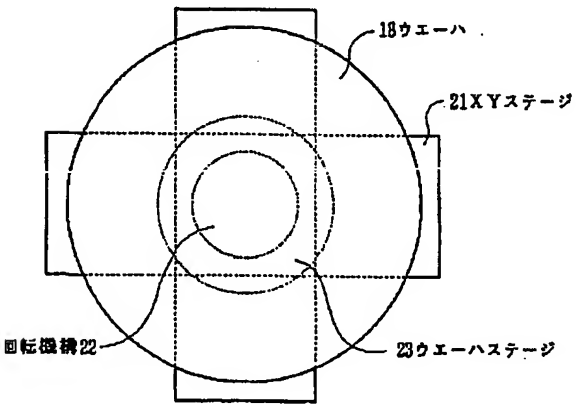


9, 10, 11, 12：モーター、　13, 13a, 13b, 14, 15, 16 ：センサー、
17：制御装置、　17a, 17b, 17c, 17d ：P.M. ドライバー、
17e ：入力セレクタ、　18：ウエーハ、

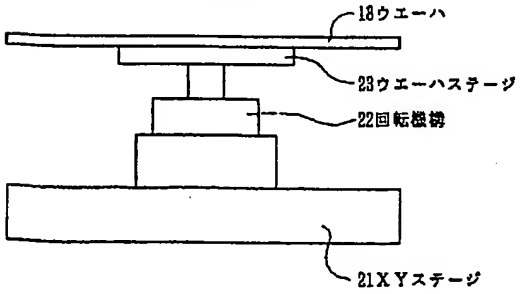
[Drawing 7]

従来の位置決め装置の概略構造を示す図

(a) 平面図



(b) 側面図



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